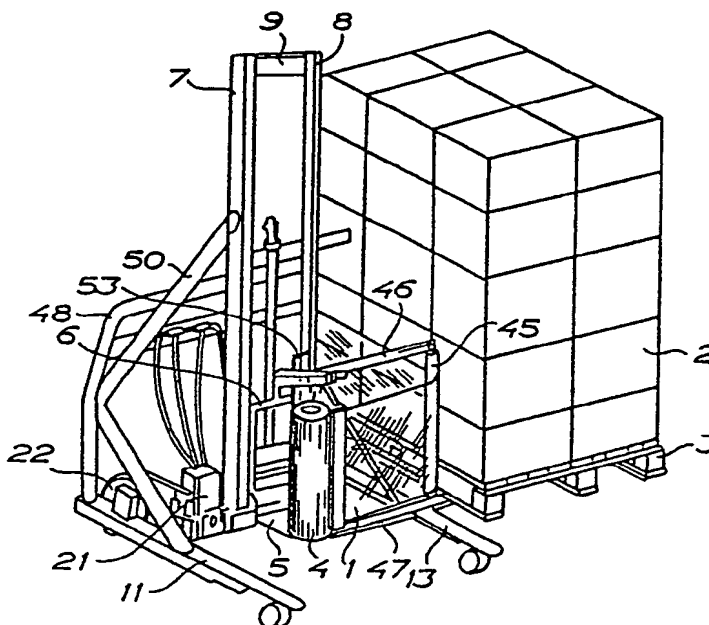




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: METHOD AND DEVICE FOR MOVING A LIFTING SLIDER IN A LIFTING DEVICE



## (57) Abstract

Method and device for moving a lifting slider of a lifting device, e.g. a lifting slider of a wrapping and packing machine for stretch film wrapping of goods positioned on a loading pallet. The lifting device comprises a lifting slider (6) driven by a hydraulic cylinder (14) through a wire (19), which doubles the movement of the hydraulic cylinder with. The hydraulic cylinder is powered by a hydraulic pump (21) which in turn is powered by the wheels (22) of the lifting device through a link means (25, 26). The hydraulic pump comprises two parallel cylinders (23, 24), which are driven so that always one of the cylinders performs a power stroke. The movements of the lifting slider are controlled by valves for performing a movement upwards, which is proportional to the speed of the lifting device, a blocked position and a lowering with constant speed.

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## METHOD AND DEVICE FOR MOVING A LIFTING SLIDER IN A LIFTING DEVICE

Field of invention

The present invention relates to a method and device for moving a lifting slider of a lifting device, e.g. a lifting slider on a wrapping and packing machine for stretch film wrapping of goods positioned on a loading pallet.

Prior art

It is previously known to use hydraulic pumps for powering a hydraulic cylinder for moving a lifting slider on a lifting device. Such hydraulic pumps are usually driven by a motor placed on the lifting device. However, such a lifting device will be heavy and cumbersome to handle. The motor is often dimensioned so that it also can drive the lifting device at the movement thereof. Such a lifting device will thus be both cumbersome and expensive to manufacture.

At smaller companies where the high cost for buying such an expensive machine cannot be justified or which are lacking place for such a cumbersome device, the wrapping of goods on a pallet often takes place by hand. A roller of stretch film is adapted on a holder. The person making the wrapping goes around the pallet and positions the stretch film by hand on the goods. However, this is a heavy and weary work and takes a long time.

The same problem exists in several different fields of applications, such as setting up electric wires etc.

Summary of the invention

The object of the present invention is to provide a method and a device specially for wrapping of goods on a loading pallet, whereby the wrapping can take place quickly and without unnecessary

wearing of the person making the work.

It is a special object of the invention to provide a device, which is easy to handle and is relatively cheap to manufacture and is relatively non-cumbersome.

5        These objects are achieved by means of a method for moving a lifting slider in a lifting device provided with wheels and being manually driven, e.g. a lifting slider on a wrapping and packing machine for stretch film wrapping of goods positioned on a loading  
10        pallet. According to the invention, the lifting slider is moved by a hydraulic cylinder, which is driven by a hydraulic pump, which in turn is driven by said wheel. Preferably, the hydraulic pump is driven so that it always makes a power stroke. According to a preferred embodiment of the invention, the hydraulic pump is driven  
15        by said wheel through an excentric disc and link arms. The hydraulic pump may comprise two cylinders, which are interconnected and are driven by said link arm so that one cylinder makes a power stroke simultaneously as the other cylinder makes a suction stroke and vice versa.

20        The invention also relates to a device for moving a lifting slider of a lifting device provided with a wheel and being manually driven, e.g. a lifting slider of a wrapping and packing machine for stretch film wrapping of goods positioned on a loading pallet. According to the invention, the device comprises a hydraulic pump adapted to drive the lifting slider by means of a hydraulic  
25        cylinder, which pump in turn is adapted to be driven by said wheel. Preferably, the hydraulic pump comprises two parallelly operating cylinders or a double-acting cylinder, whereby a link arm is adapted to drive said cylinder or cylinders, when said wheel rotates. According to the preferred embodiment of the invention, the device  
30        comprises a valve means having one or several valves, which are adapted to control the hydraulic fluid in three different operating positions, so that in a first position the hydraulic fluid is fed to the hydraulic cylinder with a constant equal rate in order to raise the lifting slider with a speed proportional to the driving speed of  
35        the lifting device; in a second position, the hydraulic cylinder is blocked in its position; and in a third position, the hydraulic cylinder is lowered with a constant rate. It is preferred that the

hydraulic pump comprises a relief valve which prevents the building up of the pressure to an excessive value, especially when the valve device is positioned in said second position.

Summary of the drawings

5 A preferred embodiment of the invention will now be described in connection with a wrapping and packing machine for placing a stretch film on goods on a pallet and with reference to the appended drawings, in which

10 Fig. 1 is a perspective view of the wrapping and packing machine;

Fig. 2 is a perspective backview showing the powering of the hydraulic pump by the wheel of the machine;

Fig. 3 is a perspective frontview showing the powering of the hydraulic pump;

15 Figs. 4 and 5 are partial perspective views of the lifting slider of the wrapping and packing machine, the slider having a support plate for the stretch film roller, said plate being positioned in the lowermost and uppermost positions on a support pillar for the lifting slider;

20 Fig. 6 is a back view of the wrapping and packing machine including the hydraulic valve means and without stretch film roller and support means therefore;

Fig. 7 is a sectional view of the hydraulic valve means in position for raising the lifting slider;

25 Fig. 8 is a sectional view of the hydraulic valve means in the blocked position;

Fig. 9 is a sectional view of the hydraulic valve means in the position lowering the lifting slider.

Detailed description of a preferred embodiment of the invention

30 The wrapping and packing machine shown on the drawings for placing a stretch film 1 on goods 2 positioned on a loading pallet 3, is completely manually driven by a worker on the floor in the hall where the goods 2 is positioned or possibly outdoors. The machine is driven around a pallet 3 several times while the stretch  
35 film 1 is stretched over the goods 2. In order that the stretch film 1 will cover the goods 2, the stretch film roller 4 from which the stretch film 1 is taken, is raised successively during the driving

of the wrapping and packing machine around the pallet 3 so that the film is wound helically around the goods. At the bottom closest to the pallet 3 and at the top of the goods 2, the stretch film 1 is wound in rings. The end of the stretch film 1 is fixed by hand. This is previously known technique.

The stretch film roller 4 must be successively raised during the wrapping of the goods 2. The roller is supported by a support plate 5 which extends from a lifting slider 6, which is reciprocable on vertical support pillars 7, 8 of the wrapping and packing machine. The lifting slider 6 is maintained movable on the support pillars 7, 8 by runners, not shown on the drawings, which abuts the inside of the support pillars 7, 8. The support pillars 7, 8 are interconnected by three cross bars 9, 10, 17 to a rectangular fixed pillar frame. The pillar frame is attached to a bottom frame 11, 12, 13 and is braced by stabilization tubes 50 on the wrapping and packing machine.

In order to reciprocate the lifting slider 6 along the support pillars 7, 8, a hydraulic cylinder 14 is attached at its lower end to the bottom cross bar 10 and at its upper end to the middle of cross bar 17. The piston rod 15 of the hydraulic cylinder 14 is provided with a cable wheel 18 at its upper end 16.

A cable runs over the cable wheel 18 and the back portion 19 of the cable is attached to a frame beam 12 in the bottom frame 11, 12, 13. The frame beam 12 is provided with an adjustment arm 49 for said back portion 19. The front portion 20 of the cable is attached to an attachment device 51 of a beam 52 of the lifting slider 6. When the hydraulic cylinder 14 is powered so that its piston rod 15 is raised, the cable wheel 18 is moved upwards. The lifting slider 6 is also raised since the cable portion 19 which runs on the cable wheel 18 is raised together with the piston rod 15. The lifting slider 6 is moved by the cable in its runners on the inside of the support pillars 7, 8 with double the speed as the speed of the piston rod 15.

In order that the hydraulic cylinder 14 shall have any hydraulic pressure to raise the piston rod 15 and since the lifting device lacks a motor, the hydraulic pump 21 of the lifting device according to the present invention is powered by the wheels 22 of

the lifting device. The movement of the wheels 22 is transferred to the hydraulic pump 21 so that it always makes a power stroke.

According to the invention this powering is provided by the fact that the hydraulic pump 21 is provided with two parallelly  
5 operating pistons in two parallelly positioned pump cylinders 23 and 24. The powering of the pistons up and down in the pump cylinders 23, 24 is performed by a rocker arm 25. One end of the rocker arm is pivotally attached to one end of a link arm 26. The other end of the link arm 26 is excentrically attached to a driving disc 27, which is  
10 centrally attached to the inner side of the adjacent wheel 22. The rocker arm 25 is pivotally supported by the housing of the hydraulic pump 21 and by a support sleeve 28. On either side of the pivot axis of the support sleeve 28 of the rocker arm 25, the piston rods of the pump cylinders 23, 24 are attached to the rocker arm 25 on equal  
15 distances from the support sleeve 28.

The piston rods of the hydraulic pump 21 are pivotably attached to the rocker arm 25 by means of two double links 29.

From Figs. 6 - 9 it appears how the lifting slider 6 is hydraulically operated for raising, lowering and blocking in a  
20 certain position.

When the lifting device according to the invention is driven forwards or backwards, the hydraulic pump 21 is simultaneously powered all the time and a hydraulic pressure is built up inside the pump. This hydraulic pressure may be controlled by two handles 30  
25 and 31 on an operating cable 32 of the lifting device. The handles may be operated for raising or lowering the lifting slider 6 or for maintaining the lifting slider 6 in a predetermined position.

When the lifting device is used for wrapping goods piled on a loading pallet with stretch film, the lifting device is first driven  
30 an attachment turn around the pallet 3, whereby the stretch film is attached to the pallet. The lifting slider 6 is neither raised nor lowered. The handles 30, 31 of the operating table 32 are positioned as shown in Fig. 8. The hydraulic fluid from the hydraulic pump 21 is pumped through a hydraulic conduit 33 as shown by means of an  
35 arrow 33' from the hydraulic pump 21 to the attachment 34 of the operating table 32 and to a control valve 35, the body of which by means of the right handle 31 of the operating table 32 is adjusted

so that the hydraulic fluid is pumped as shown by the arrow 37' out through an end portion 36, which by means of a hose 37 is attached to a fluid sump of the hydraulic pump 21.

In order to block the lifting slider 6, the left handle 30 of the operating table 32 by means of which the control valve 38 for the lifting slider 6 is operated, is positioned so that the lower connection 39 for a pressure hose 40 to the hydraulic cylinder 14 is connected to a connection tube 41 between the control valve 38 and control valve 35, the inlet of the connection tube 41 to the control valve 35 being closed by the body of the valve in the mentioned position.

Thus, the lifting slider 6 will remain in the blocked position and the hydraulic fluid is pumped in a closed loop in the conduit system.

When the attachment turn of the stretched film around the goods has been terminated, the lifting slider 6 is successively raised while the lifting device is driven around the pallet several times. The handles 30 and 31 of the operating table 32 are then placed in the position shown in Fig. 7. The hydraulic fluid is pumped as shown by the arrow 33' from the hydraulic pump 21 through the hydraulic conduit 33 to the control valve 35 and through the open connection through the connection tube 41 to the control valve 38. Thence, the hydraulic fluid is fed as shown by the arrow 45 through the pressure hose 40 to the hydraulic cylinder 14. Thus, the lifting slider 6 is raised successively in proportion to the driving of the wrapping and packing machine around the goods on the pallet and the stretched film is applied on the goods.

When the stretched film is positioned on the goods 2 in its entire height with overlap between the adjacent layers of stretched film, there is positioned a special top turn of the stretched film. Then, the lifting slider 6 shall be neither raised nor lowered in the same way as by the attachment of the stretched film as described above by reference to Fig. 8.

If the intention is to completely cover the goods 2 with stretched film, a so called top sheet is manually positioned on the upper portion of the goods 2. Thereafter, the wrapping and packing machine is driven some turns around the pallet while raising the



lifting sliders 6, whereafter the locking turn without raising the lifting slider is made as the terminating operation.

When the wrapping is ready, the lifting slider 6 shall be lowered to the bottom position. Then, the handles 30 and 31 on the operating table 32 are positioned as shown in Fig. 9. The control valve 35 directs the hydraulic fluid entering from the hydraulic conduit 33 as shown by the arrow 33' to the end portion 36 and out through the hose 37 as shown by the arrow 37' to the fluid sump of the hydraulic pump 21. The hydraulic fluid is consequently only pumped in a closed loop. As shown by the arrow 42, hydraulic fluid from the lower portion of hydraulic cylinder 14 is fed to the control valve 48, through the control valve 38 and through the lower connection 39 to a second end portion 43, which is connected to the fluid sump of the hydraulic pump 21. The flow is shown by the arrow 44. Thus, the lifting slider 6 can also be lowered successively at the driving of the lifting device.

The hydraulic pump 21 is of the so called double piston type. One turn of the wheel gives a double stroke, i.e. each pump piston has performed a complete pump cycle.

There are double-acting hydraulic cylinders, which could replace the two separate cylinders if provided with suitable valves.

In order to extend the stretch film 1 from the stretch film roller 4 against the goods 2 on the pallet, there is provided a vertical guide roller 45 adapted between an upper and a lower beam 46, 47, which extend somewhat outside the profile of the wrapping and packing machine.

In order to use the elastic property of the stretch film 1 in an efficient way for wrapping the goods, the stretch film roller 4 is adapted for cooperation with a brake placed on the support plate 5 of the lifting slider 6. The brake is activated and deactivated by a brake handle 53 close to the upper attachment of the stretch film roller 4. The brake can be made as a double jaw-shaped sliding brake having spring-loaded jaws. The brake handle 53 is connected to an excentric disc, which is placed between said jaws for activating and deactivating the brake.

In order that a person easily shall be able to drive the wrapping and packing machine on the floor of a hall or outdoors, the

back portion is provided with a tube frame 48 in the height of the elbows having such a cross section that it constitutes a suitable handle for the driving.

The support of the stretch film roller 4 on the support plate 5 has not been shown in details. However, from Fig. 1 it should appear how the support can be made for performing the invention at a wrapping and packing machine for stretch film wrapping. In Fig. 6, the portions showing the support of the stretch film roller 4 between the support pillars 7, 8 have been excluded in order to simplify the figure.

In order to enhance the safety, the connection tube 41 can be provided with a one-way-valve, which prevents the lifting slider from falling down at failure of the power hose 33.

Moreover, the hydraulic pump is provided with a pressure relief valve or safety valve which prevents that the hydraulic pressure may be built up to an excessive value.

While the invention has been disclosed in connection with a wrapping and packing machine it is clearly understood that the inventive idea can be used in other environments. Thus, it is possible to use the lifting slider according to the invention for adapting electric wires, positioned on a wire roller, which easily is kept on the desired place by the present device.

There are certain modifications which are obvious to a skilled person which we believe will be within the scope of the present invention. Thus, it is possible to arrange the two control valves 35, 38 in a single valve performing the same function. Moreover, the hydraulic pump may be a screw pump provided with suitable valves for giving a positive pressure in both rotational directions, that is when the device is driven forwards as well as backwards. It is possible to make the rate of raising the lifting slider at the driving of the device adjustable. This is possible by adjusting the excentricity of the lever arm 26 and excentric disc 27 or by changing the connection between the lever arm 26 and the rocker arm 25. It is also possible to adjust said speed hydraulically. Furthermore, the hydraulic cylinder 14 and the cable 19 may very well be replaced by a single long hydraulic cylinder such as the well-known ORIGA-cylinder.

It is clearly possible to change the hydraulic system to a pneumatic system in which case the hydraulic sump is not necessary.

In order to adjust the rate of lowering the lifting slider, the hose 48 is provided with a throttle valve 54 as shown in Fig. 6.

5 The wrapping and packing machine is built in a certain standard height which is 1650 mm from the floor. However, there may be different heights of the device.

The wrapping and packing machine may be provided with protection plates for extending portions, e.g. at the front wheels.

10 The invention may be modified in many respect within the scope of the invention. Such modifications obvious to a skilled person are intended to be within the scope of the invention. The invention is only limited by the appended patent claims.

## CLAIMS

1. Method for moving a lifting slider in a lifting device provided with wheels and being manually driven, e.g. a lifting slider on a wrapping and packing machine for stretch film wrapping of goods positioned on a loading pallet, characterized in that the lifting slider is moved by a hydraulic cylinder, which is driven by a hydraulic pump, which in turn is driven by said wheels.
2. Method according to claim 1, characterized in that the hydraulic pump is driven so that it always makes a power stroke.
3. Method according to claim 2, characterized in that the hydraulic pump is driven by said wheel through an excentric disc and link arms.
4. Method according to claim 3, characterized in that the hydraulic pump comprises two cylinders, which are interconnected and are driven by said link arms so that one cylinder makes a power stroke simultaneously as the other cylinder makes a suction stroke and vice versa.
5. Device for performing the method according to claim 1 for moving a lifting slider of a lifting device provided with a wheel and being manually driven, e.g. a lifting slider of a wrapping and packing machine for stretch film wrapping of goods positioned on a loading pallet, characterized by a hydraulic pump (21) adapted to drive the lifting slider (6) by means of a hydraulic (14) cylinder, which pump in turn is adapted to be driven by said wheel (22).
6. Device according to claim 5, characterized in that the hydraulic pump comprises two parallelly operating cylinders (23, 24) or a double-acting cylinder, and in that link arms (25, 26) are adapted to drive said cylinder or cylinders, when said wheel (22) rotates.

7. Device according to claim 6, characterized by a valve means comprising one or several valves (35, 38), which are adapted to control the hydraulic fluid in three different operation positions, so that in a first position the hydraulic fluid is fed to the hydraulic cylinder with a constant equal rate in order to raise the lifting slider with a speed proportional to the driving speed of the lifting device; in a second position, the hydraulic cylinder is blocked in its position; and in a third position, the hydraulic cylinder is lowered with a constant rate.

8. Device according to claim 7, characterized in that the hydraulic pump comprises a relief valve which prevents the building up of the pressure to a too high value, especially when the valve device is positioned in said second position.

9. Device according to any one of claims 5 - 8, characterized in that the hydraulic pump and the hydraulic cylinder is replaced by a pneumatic pump and a pneumatic cylinder.

10. Device according to any one of claims 6 - 9, characterized in that a link arm (26) at one end is excentrically and pivotably attached to the side of the wheel (22) and at its other end is pivotably attached to a rocker arm (25), which is pivotably attached to the ends of the piston rods of the hydraulic pump and is pivotably supported by the housing of the hydraulic pump, whereby one end of the link arm (26) is attached to a driving disc (27) on the side of the adjacent wheel.

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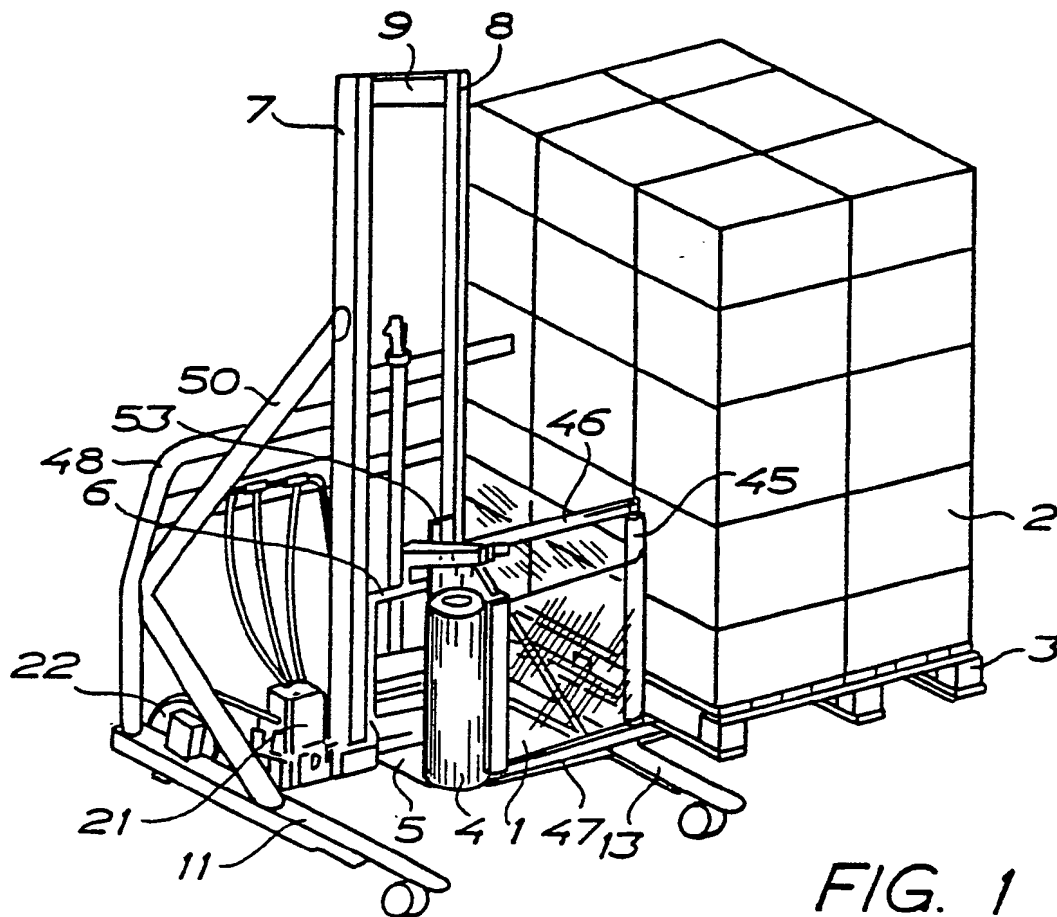


FIG. 1

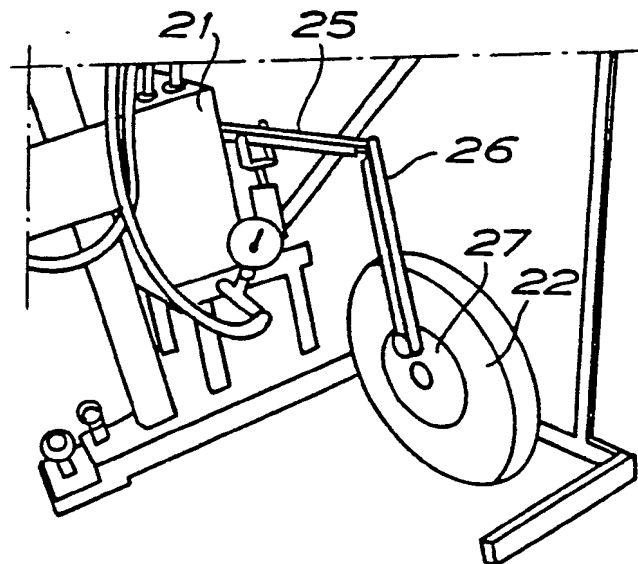


FIG. 2

CUSTRAL CHIST

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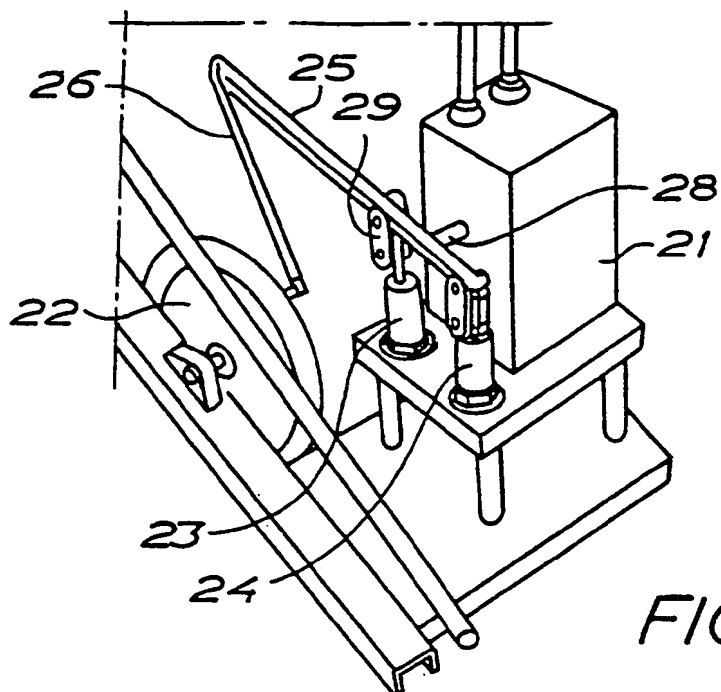


FIG. 3

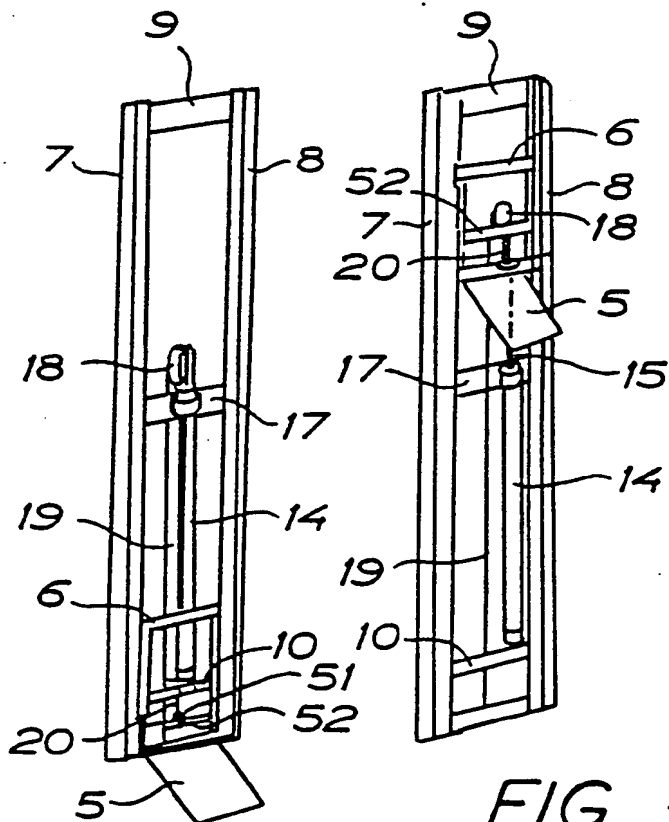


FIG. 4

FIG. 5

FIG. 3

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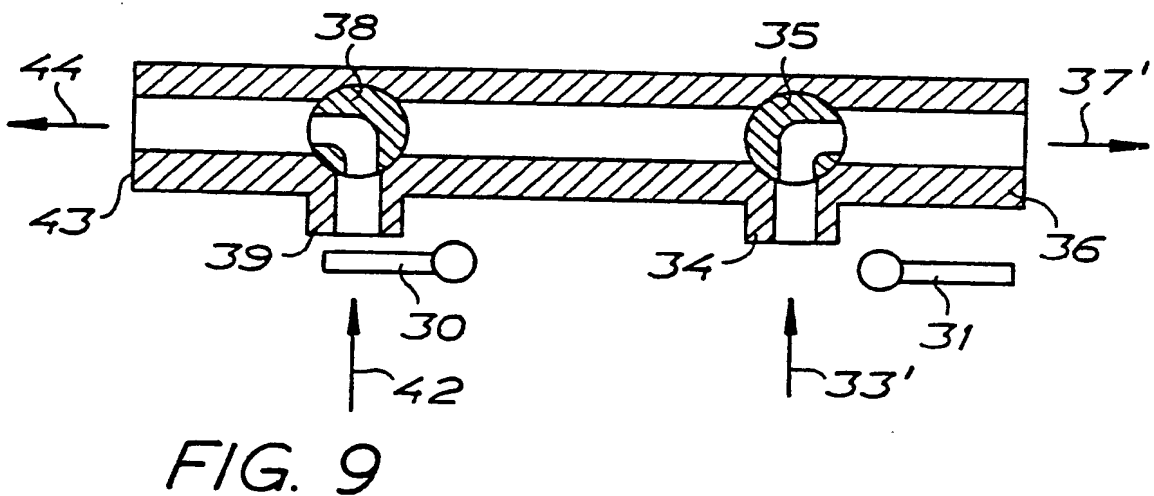
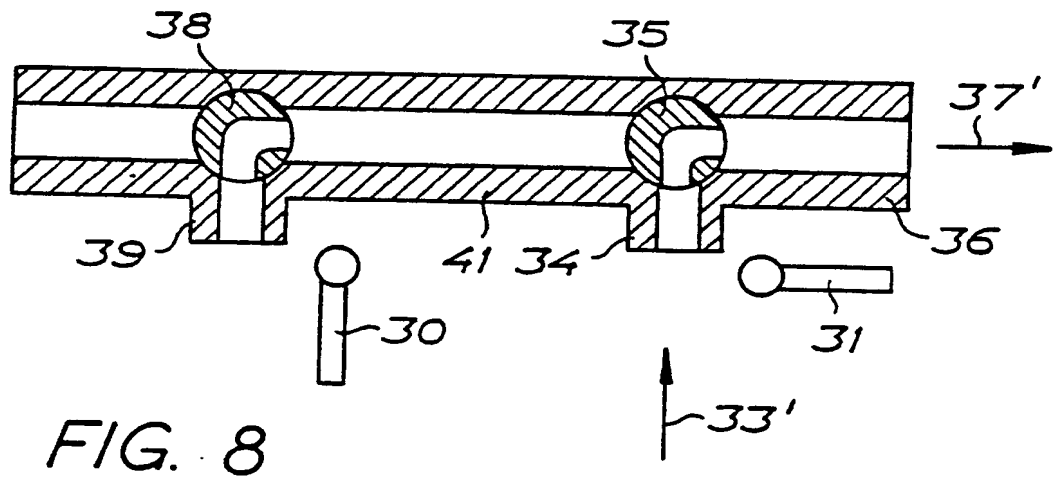
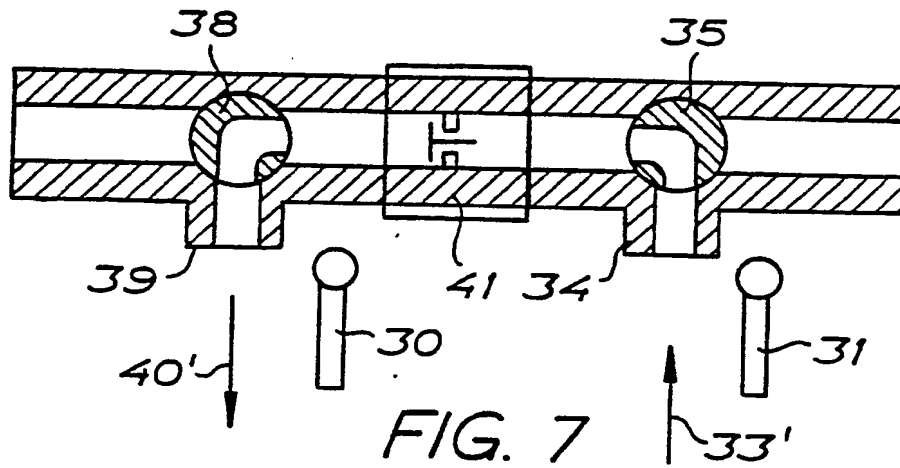
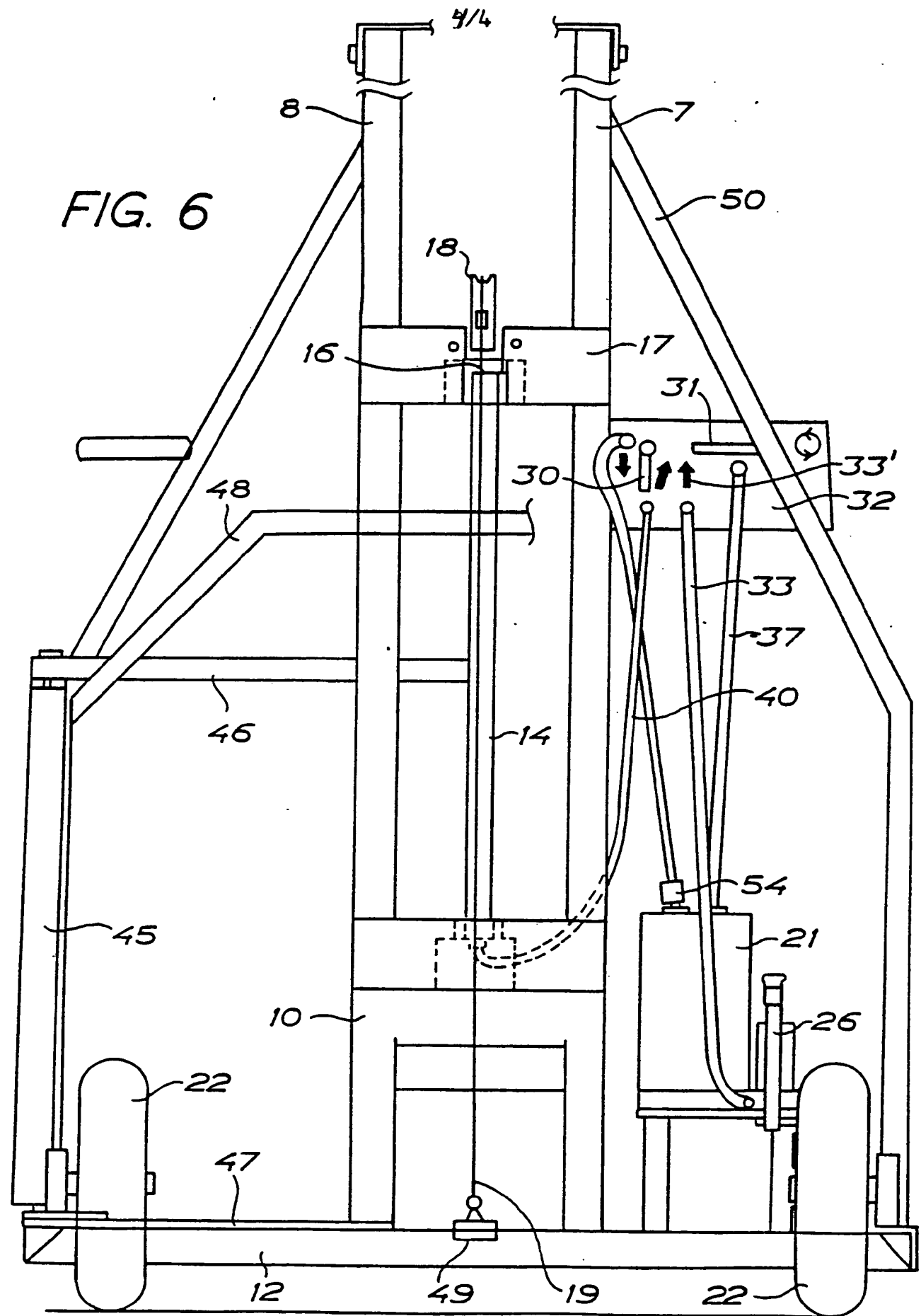


FIG. 10






# INTERNATIONAL SEARCH REPORT

International Application No

PCT/SE85/00480

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4		
B 65 B 11/04		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC 4	B 65 B 9/14, 11/00, /02, /04, /06, /54, /56, 27/02, 41/12	
US Cl	53:30, 32, 33, 184, 183, 198, 203, 210, .../...	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT *</b>		
Category *	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
A	SE, B, 436 190 (GOLDSTEIN) 19 November 1984	1, 5
A	DE, A1, 3 140 972 (SHULMAN) 3 June 1982	1, 5
A	US, A, 4 067 174 (GOLDSTEIN) 10 January 1978	1, 5
A	US, A, 4 282 700 (GOLDSTEIN) 11 August 1981	1, 5
A	US, A, 4 369 614 (TETZNER) 25 January 1983	1, 5
A	US, A, 4 429 514 (LANCASTER) 7 February 1984	1, 5
A	EP, A2, 0 086 045 (KEOGH-PETERS) 17 August 1983	1, 5
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>* Special categories of cited documents: 10</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
1986-02-14	1986-02-18	
International Searching Authority	Signature of Authorized Officer	
Swedish Patent Office	 Christina Nordström	

## FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

II

Fields Search (cont)

211, 214-216, 461-466, 556, 557, 580, 587-589

Nat Cl 35a:1/03; 35d:5/01, /02, /04, 10/05

US Cl 187: 1, 2; 294: 2, 89, 90, 92, 93

V. ☐ OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE <sup>1</sup>

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. ☐ Claim numbers..... because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claim numbers..... because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claim numbers..... because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4(a).

VI. ☐ OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING <sup>2</sup>

This International Searching Authority found multiple inventions in this international application as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.
2. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:
3. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:
4. ☐ As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

## Remark on Protest

- ☐ The additional search fees were accompanied by applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

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